# Disease in captive wildlife

## Facts and sources

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## TB TRANSMISSION TO HUMANS

**Issue 1: Tuberculosis (Mycobacterium bovis) in elk, deer and cattle can be transmitted to humans. This form of TB can cause severe disease and even death.**

In 1990 a veterinarian in Alberta, Canada, was found to have the bacterium in his saliva after treating a captive elk with TB. Dr. Anne Fanning, a doctor specializing in the disease for Alberta Health in Edmonton, said she is certain the vet was infected by the animal. Fanning continued her investigation of TB infection by captive elk, ultimately testing 560 people who in some way (farmers, meat inspectors, slaughterhouse workers and others) had contact with captive elk.

While the TB exposure history of many of the people was ambiguous, Fanning said she believes at least nine people for certain began testing positive for bovine tuberculosis after exposure to contaminated elk.

### TB at a rendering plant

Many people tested positive for TB at Northern Alberta Processing Co., a rendering plant. In February, 1991, the plant processed some 500 elk that had been slain at a farm because the herd was infected with TB. Barry Glotman, Northern Processing's manager, said, "The majority of the people who skinned them out ended up testing positive for TB." Even some truckers and others who did not handle the elk tested positive after the incident. Some workers may have been exposed to TB somewhere other than Northern Alberta Processing.

According to Fanning, the best known method of transmitting bovine TB to humans is through consuming infected milk. Pasteurization prevents that. Fanning and other researchers said the organism also can be exhaled into the air and shed in feces, saliva, and some bodily discharges. The bacteria can last a long time in warm, moist protected environments, according to Thomas Roffe, a veterinarian specializing in wildlife diseases at the U.S. Fish and Wildlife Service's Wildlife Health Research Center in Madison, Wis.

In the Northern Processing Co. case, researchers believe TB bacteria became airborne, causing humans to be exposed when power equipment was used on the dead animals or when parts of the plant were cleaned with hoses. Coughing by sick animals also can spread the disease.

Referring to the Canadian outbreaks, Roffe said, "An alarming number of people were exposed."

Most of the Canadians testing positive for TB are being monitored and treated.

The transmission of TB from elk and other animals to humans isn't just a concern to Canadian health authorities.

Kay Anderson, manager of the Tuberculosis Control Program at the Washington Department of Health, commented, "The possibility of the spread of tuberculosis to humans and domestic livestock in Washington State is certainly a primary concern in the movement

of animals."

### Risk to hunters

Rick Kahn, a biologist for the Colorado Division of Wildlife, warned that hunters could be the persons most at risk for TB if infected domestic animals spread the disease to native elk and deer. He explained that hunters, who don't wear surgical gowns and protective gloves while dressing out their harvested game, could be infected while gutting the animals. If TB is established in wild animals, Kahn said, "I don't know how you (Washington state) can in good conscious offer a hunting season."

Kay Anderson, the Washington Department of Health's TB program manager, noted that a person is more likely to contract the disease from an infected animal than from an infected human.

Kahn also noted that Alberta is not the only place having to slaughter whole herds of captive wildlife because of TB infection. In another example, he said Colorado had to destroy an elk herd. Seventy-five percent of the animals were infected with TB. Another herd is in quarantine.

Animals are slaughtered because treatment for TB is difficult.

Dr. Tom Thorne, a veterinarian with the Wyoming Game and Fish Department, predicted a medical and economic calamity could easily occur if a disease such as TB enters wild animal populations.

Key points of his scenario include:

- The passage of weeks or months between the time that the first TB lesions were found in a wild animal and the completion of tests.
- Systematic examination of wild animals harvested by hunters to determine the extent of the TB infection. The survey probably would require several years.
- An eventual determination that TB was widespread and spreading would bring demands from the livestock industry for immediate slaughter of the affected free-ranging wildlife, regardless of the number of animals affected.
- Anti-hunting groups would file lawsuits to prevent the widespread killing of wildlife. The biological and disease issues would then become political and legal. The pro-animal groups would demand the removal of livestock from public lands.
- Anti-hunting groups would use the TB issue to stop hunting.
- Fearful of contracting TB, many sportsmen would stop hunting.

"The end result would be an ever increasing tuberculous (afflicted) free-ranging wildlife population with concommitant ever increasing opportunity for exposure of livestock and loss of economic benefit to the local community generated by hunting," according to Thorne.

For hunters and other humans contracting TB, the issue would become much more important than just economics.

According to the Centers for Disease Control in Atlanta, Ga., TB treatment in humans requires daily medication typically lasting six months to a year. People who test positive for TB carry a lifelong risk of the disease becoming active.

Researchers also warn that some forms of TB again are becoming serious problems in poor urban areas and among AIDS patients and others with deficient immune systems.

*For additional information, contact:*

*Dr. Anne Fanning, Tuberculosis Service, Alberta Health, Edmonton, Alberta (403) 492-6455*
*Barry Glotman, manager, Northern Alberta Processing Co., Edmonton, Alberta, (403) 472-6750*
*Thomas Roffe, PhD, DVM, U.S. Fish and Wildlife Service Wildlife Health Research Center, Madison, Wis. (608) 264-5411*
*Rick Kahn, Colorado Division of Wildlife, (303) 291-7349*
*Kay Anderson, manager, Tuberculosis Control Program, Washington Department of Health, (206) 464-5327*
*Dr. Tom Thorne, Wyoming Game and Fish Department, (307) 766-5628*

## TB TRANSMISSION TO WILDLIFE/CATTLE

**Issue 2: An outbreak of TB or other disease in native wildlife could be devastating to wildlife and cattle.**

Dr. Ward Stone, wildlife pathologist for the Division of Fish and Wildlife in the New York Department of Environmental Conservation, said not only has TB from a captive deer herd infected cattle in New York, but he fears for the state's growing white-tailed deer population.

He explained that the deer population is growing rapidly because of changes in the state's habitat. "They are more prone to disease introduction than they have been at any time in my lifetime because of (their) dense population," Stone said of the white-tailed deer. "The population is ripe for the introduction of disease."

"It would be my suggestion not to have the (captive wildlife) farms," Stone said. He added, however, they are growing in popularity. He urged any state permitting the captive wildlife facilities to enforce the best standards in medical control and fencing.

Dr. John Huntley, a veterinarian with the New York Department of Agriculture and Markets, said there were "three separate outbreaks of (TB) in captive-raised cervidae (deer and elk) in New York" in 1991-92. The three herds were destroyed as a disease-control measure. He said the outbreak caused the U.S. Department of Agriculture to lower New York's TB status from "accredited tuberculosis free" to "a modified accredited tuberculosis state."

He said that translated "to a reduction in the ability to move cattle untested interstate," and further reduced "the international marketability of New York State cattle."

Dr. Huntley said, "The tuberculosis issue is dramatically portrayed by the spill-over of tuberculosis in cervidae to two dairy cattle herds."

## TB TRANSMISSION TO PETS

**Issue 3: House cats, badgers and other animals can be infected by captive wildlife or cattle and transmit TB to humans.**

Dr. Michael Mirsky, of the Department of Veterinary Pathobiology at the University of Illinois, investigated the death of a captive Asian sika deer on an Illinois farm. The animal was found to have TB. Further investigation found other deer on the farm were infected as well as a cat. Two other cats had no evidence of TB. The farmer would not permit the researchers to euthanize two dogs on the farm so they could be checked for TB.

"Cats seem to be more prone to pick up M. Bovis (TB). . . . They offer a potential source for transmission but I'm not sure how great a potential there is," said Mirsky.

He and his colleagues have written, "Transmission of M bovis (TB) between cats and cattle and between cats and human beings has been documented."

Cats aren't the only carriers of TB, however.

Two government researchers from New Zealand, C.G. Mackintosh and N.S. Beatson, have reported possums and badgers feeding in pastures contaminated by infected cattle have acquired TB and passed the disease to disease-free herds of cattle.

*For additional information, contact:*

*Dr. Michael Mirsky, Department of Veterinary Pathobiology, College of Veterinary Medicine, University of Illinois, Urbana, Ill. (217) 333-2249.*
*"Relationships between diseases of deer and those of other animals," by C.G. Mackintosh and N.S. Beatson, The Biology of Deer Production, The Royal Society of New Zealand, Bulletin 22, 1985.*

## ESCAPE OF CAPTIVE ANIMALS

**Issue 4: Captive wildlife can and do escape, posing a threat of infection and cross-breeding with free-ranging wildlife and to compete for habitat.**

In December 1991, the Ontario Federation of Anglers and Hunters, the Canadian province's major sportsmen's group, reacted angrily when more than 90 red deer escaped into the wild from a slaughterhouse where they were transported for eradication because of infection from a lethal parasite known as "muscle worm."

The parasite, which is carried by red deer and transmitted through snails and slugs acting as intermediate hosts, is considered a threat to native North American wildlife populations.

It took officers of the Ontario Ministry of Natural Resources, using helicopter support, several days to gun most of the animals down.

News media from many parts of Canada covered the incident extensively. Officials of the Ministry of Natural Resources say the episode created hard feelings toward captive wildlife operations from hunting, conservation and animal welfare groups.

## Tip of the iceberg?

The red deer escape from the Ontario slaughterhouse is only the tip of the iceberg when it comes to concerns over spreading disease and parasites to wildlife, in the opinion of Dr. Edward Addison, wildlife health scientist in the Wildlife Research Section of the Ministry.

Already, he said, red deer herds on two Ontario game farms have been ordered destroyed after parasite larvae were found among the captive animals.

Muscle worm originated in Eurasia, and was introduced into New Zealand with exotic animals, and Dr. Addison said there is a real danger that muscle worm has been introduced into free-ranging North American wildlife populations through red deer, which are closely related to native elk and can breed with native elk.

Dr. Addison said recent scientific advances have revealed that existing tests, which have been considered state-of-the-art for detecting muscle worm, are inadequate. Moreover, the testing procedures were not consistently applied to the 8,000 red deer and 6,000 fallow deer introduced from New Zealand since 1988, he said.

Dr. Addison is concerned about the risk of spreading disease and parasites through the transportation of wildlife and exotic animals.

"I see no disease organisms that respect man's boundaries," he said. "I'm not just concerned about Ontario; I am concerned about the continent."

He added, "Translocation should not be done without use of decision making models that take into account all important ecological considerations."

## No escape proof fences

Experts say there are no easy ways to prevent the escape of captive wild animals, such as deer and elk and exotic sheep.

"No fence is escape proof," agreed Ward Stone, a wildlife pathologist with the New York Division of Fish and Wildlife in the Department of Environmental Conservation. Even if a fence is high enough and built well, trees can knock them down in storms and vandals open them.

Fences for some wild animals, such as sheep, need to be up to 12 feet high, said Rick Kahn, wildlife biologist with the Colorado Division of Wildlife.

Kahn noted it has taken thousands of generations for domestic animals like cattle and sheep to become tame. Elk and deer in captive herds are still wild animals, he said. Once free, they attempt to remain free and seek other non-captive animals with which to breed. That instinct also provides the opportunity to genetically change native wildlife.

*For additional information, contact:*

*Ray Stefanski, senior ecologist, Agricultural Ecosystems Wildlife Policy Branch, Ontario Ministry of Natural Resources, (416) 314-1070*
*Edward Addison, PhD, wildlife disease scientist, Wildlife Research Section, Ontario Ministry of Natural Resources (416) 832-7124*
*Ward Stone, wildlife pathologist, Division of Fish and Wildlife, New York Department of Environmental Conservation (518) 439-8017*
*Rick Kahn, wildlife biologist, Colorado Division of Wildlife (303) 291-7349.*

## TRANSMISSION OF BRUCELLOSIS

**Issue 5: In addition to TB, captive wildlife could spread brucellosis to free-ranging wildlife, cattle and even humans. In humans, the disease is called undulant fever.**

Thomas Roffe, the veterinarian for the U.S. Fish and Wildlife Service in Madison, Wis., said both cattle and humans are susceptible to the type of brucellosis found in elk. He said there is no documented proof that the disease, which causes abortions in wild animals and cattle, has been transmitted from free-ranging wildlife to cattle. But he added that in the Yellowstone ecosystem, near Yellowstone National Park, where large numbers of bison and elk show evidence of the disease, brucellosis has occurred in cattle. Because no other source of the disease has been found, some people blame the wild animals. "No one really knows the risk of transmission," Roffe said.

Roffe also said a hunter in the Yellowstone area became infected with brucellosis from handling an elk fetus in Montana. The veterinarian said hunters could be at risk when handling the internal organs, particularly fetuses, of an infected animal. In humans, the disease produces flu-like symptoms, Roffe said.

"No one really knows the risk of transmission," Roffe said.

*For additional information, contact:*

*Thomas Roffe, Wildlife Health Research Center (608) 264-5411*

## INTRODUCTION OF EXOTIC DISEASES

**Issue 6: Exotic wildlife species could expose native wildlife to new diseases.**

"With exotic animals, we have no idea what kind of diseases we may be introducing," said Rick Kahn, the Colorado Division of Wildlife biologist.

Trifling with exotic diseases can prove devastating in the wild. The Aug. 18, 1992, edition of The New York Times reported that plant pathologists hope they are on the verge of resurrecting the American chestnut tree, once one of the dominant and most economically important hardwood trees on the Eastern Seaboard. In 1904 botanists at the Bronx Zoo in New York found trees they had imported from the Far East introduced chestnut blight in the United States. The blight, a fungus that girdled the trees and cut off nutrients and water, killed several billion mature American chestnut trees.

In another example, a rabies outbreak, which has required thousands of people to be immunized against the disease, occurred in the mid-Atlantic states, after someone, possibly hunting clubs in the Virginia or West Virginia, imported raccoons from Florida. The epidemic now affects some seven states and is moving at a rate of 20 to 40 miles per year, according to Randall Stumvoll, supervising wildlife biologist in New York State. Most of the people were exposed after pet dogs fought rabid raccoons, Stumvoll said. In New York, the epidemic has forced state agencies to impose strict rules on animal rehabilitators, breeders of fur-bearing

animals and others.

*For additional information, contact:*

*Rick Kahn, Colorado Division of Wildlife (303) 291-7349*
*Randall Stumvoll, supervising wildlife biologist, Department of Environmental Conservation, 518-457-3730*

## PROBLEMS WITH DISEASE TESTS IN WILDLIFE

**Issue 7: No adequate tests exist even for familiar wildlife diseases such as TB and brucellosis.**

Dr. John Huntley, a veterinarian with the New York Department of Agriculture and Markets, said he has worked extensively with TB tests for captive wildlife. He said spot-checking animals for disease is unreliable.

He said he has confidence in available tests if they are used on entire herds of captive wildlife.

"I have very little confidence in individual tests certifying individual animals (as disease free)," said Huntley.

"They are still trying to find a specific test for TB in deer and they haven't yet come up with one that is reliable," said Michael Mirsky, of the University of Illinois' College of Veterinary Medicine.

Rick Kahn, biologist for the Colorado Division of Wildlife, said his state allows owners of captive wildlife to import animals from other states or nations only when the herd from which the animals come has been tested for TB.

Testing whole herds of captive -- but still wild -- elk or deer is difficult and expensive.

Kahn explained the most reliable TB test requires an owner to get control of each animal, shave hair from its hide and administer the test. Each animal must be re-examined within 72 hours. Kahn said his state does not allow farmers to tranquilize the animals with dart guns each time. That means the farmers must have sophisticated (and expensive) animal control facilities like squeeze chutes.

*For additional information contact:*

*Dr. John Huntley, New York Department of Agriculture and Markets, (518) 457-3880.*
*Dr. Michael Mirsky, Department of Veterinary Pathobiology, College of Veterinary Medicine, University of Illinois, Urbana. (217) 333-2249.*
*Rick Kahn, Colorado Division of Wildlife (303) 291-7349.*

## WHO PAYS THE COSTS OF DISEASE TESTING PROGRAMS?

**Issue 8: Testing for disease in captive herds of wildlife and deleterious exotics is expensive. The Washington Department of Wildlife is not funded to absorb such costs.**

In New York, the Department of Agriculture and Markets developed a first-year TB control plan because of disease problems with captive deer herds. The plan, which provided for testing of captive deer and elk herds, some cattle herds and some llama herds, identified first-year costs of $658,000, for TB control alone.

TB is only one of the animal health issues that wildlife managers are concerned with in Washington and other Western states.

*For additional information, contact:*

*Dr. John Huntley, New York Department of Agriculture and Markets, (518) 457-3880.*

## SELF-POLICING BY INDUSTRY

**Issue 9: Some importers and breeders of wild animals have not "policed themselves" to prevent escape of captive animals.**

Dr. Michael Mirsky, the Illinois wildlife researcher who attempted to determine the TB threat posed by infected deer in his state, said animals from an infected herd were sold in both Illinois and Missouri. He said he had to give up his investigation because animal owners were unwilling to help him.

"People were not really willing to help out," he said.

Gary Burke, an investigator with the Montana Department of Fish, Wildlife and Parks, has testified that the commercial wildlife business in his state was riddled with fraud and illegal trapping.

A recent survey of captive wildlife facilities by the Washington Department of Wildlife found that not all operators of captive game facilities in Washington have policed themselves. For example:

- One rancher released non-native turkeys without a permit.
- One rancher released Texas dall sheep because the animals had become sexually mature. Another said mouflon sheep escaped and admitted he was surprised at how difficult they were to keep.
- An eastern Washington rancher stated he sold exotic animals to persons he did not know because the animals kept getting out or people shot them.
- A rancher admitted selling velvet antlers in violation of existing law.
- A rancher sold a cougar to another person, in violation of state law.
- Fence corners on at least one ranch could be rolled back to allow free wildlife to move back and forth on to private property.
- While some owners maintained excellent records, several had no records.

The cost of testing is serious enough, and the TB problem in captive wildlife herds is widespread enough, that national legislation has been introduced in Congress (H.R. 5775) to provide a voluntary national insurance program for captive wildlife operations having elk infected with, or exposed to TB.

*For additional information, contact:*

*Dr. Michael Mirsky, Department of Veterinary Pathobiology, College of Veterinary Medicine, University of Illinois (217) 333-2249.*
*Ron Peregrin, Assistant Chief of Wildlife Enforcement, Washington Department of Wildlife, (206) 753-1605.*
*Gary Burke, supervisor, Special Investigation Unit, Montana Department of Fish, Wildlife and Parks, (406) 444-2452.*

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**For questions about this research, contact the Washington Department of Wildlife: Jeff Weathersby, Dave Workman, Ed Isenson, (206) 753-5707**

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